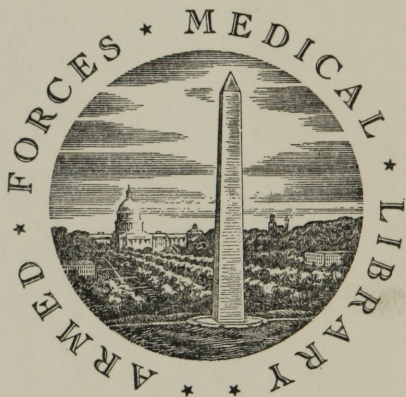


UNITED STATES OF AMERICA



FOUNDED 1836

WASHINGTON, D.C.

368493

DOCTOR BENJAMIN RUSH,

PROFESSOR OF CHEMISTRY, IN THE UNIVERSITY OF PENNSYLVANIA.

SIR,

AS the following thesis contains physical observations which do not appear to me to have been ever before made on similar principles of natural philosophy, I therefore have justly considered no one more proper for me to dedicate it to, than one whose distinguished abilities are so celebrated, and universally known, that my researches upon the subject, should consequently become the more interesting and satisfactory to the reader; but if you should conceive there was just room for difference of opinion, I should be glad to receive it, and annex it to this small pamphlet.

To be eminent in surgery, how natural is it to conclude, that a man must be capable of performing with ease and address, the various important operations which fall within the line of his province; at the same time we will conceive him sufficiently well versed in all the systematic branches of anatomy, &c. By the same rule, we will not allow a man is a physician, because he attends the sick, and prescribes remedies for them, unless he is capable of stating his cases, and making a report of his method of cure, so as to give full satisfaction to any learned and approved faculty of physicians: but indeed it is to be regretted there is more room for pretenders to the latter, than to the former science.

The venerable Hippocrates has complained, that in his days many hid their ignorance under ornaments of dress, and strove to get the good liking of the people by their appearance at public games. But in those more enlightened ages, it is not a little to be admired, why the legislature do not take every possible means to prevent any such impositions in the healing art, which is so interesting to mankind in general.

With profound respect and esteem, I am,

Your most obedient humble servant,

MICHAEL BOURKE.

Norfolk, Virginia, Feb. 10th, 1792.

R E V I E W, &c.

HAVING lately observed various fugitive pieces on the hydrophobia, of little account, it particularly drew my attention to a theme which appears to me to have been but very little understood by most of those who have attempted to treat upon it.

With astonishment I have observed them propose to condemn the practice of the ancients, without giving any sufficient physical reasons, why their practice should be altogether or in part abolished; for, the want of success, in one or more cases, is not sufficient to reject it; unless the particular state of different patients, differently treated, could be exactly ascertained and stated; or otherwise an error must be proved upon undeniable and known principles of natural philosophy. However, in the course of these enquiries upon the subject, I shall endeavour to show how far they were right, and how far wrong in this respect, and at the same time, we will also take the practice of the moderns into consideration, with a view to establish and make any amendment it would seem to admit of.

There are many methods of cure on record, in this disorder, said to be equally successful, but most of them are rather chimerical and not to be depended upon; therefore, it would tend rather to confuse than be of any real advantage, to insert them.

The morbid animal poison, which produces this dreadful disorder, causing no apparent change in the state of the solids and fluids, as the other poisons of this class do, except on the part to which it was first applied; from this, one would naturally conclude, the evil was conveyed into the constitution by means of the nervous fluid; and I am persuaded, it was reflexions of this nature, that first led Boerhaave and Mead to think so; I confess I was strongly attached to this opinion too; but from the result of more serious reflexion upon that head, I shall endeavour to prove that the brain every where throughout the body, and the cellular membrane, are the proper seat of it: for this is not the only disorder of the brain and its productions, which does not appear to effect any change in the substance of it any where.

It is allowed by all, that the brain is the only sensible part of the body, and that it is diffused over every moving fibre, in form of a sensible mucus (which Kirkland calls it, in his dissertation upon that organ) which fibres are connected by means of the cellular membrane.

The canine virus coming in contact with the human body, either in a dry or humid state, whether with or without a wound, the stimulus it occasions is first felt and attracted by the brain, and is received sooner or later, by sympathy of affection, into the habit.

Dr. James, in his treatise on this subject, supposes the cellular membrane is the receptacle of this as well as some other infections: indeed it cannot admit of any doubt, that those parts are the seat of it, from the exquisite degree of sensibility always manifest in the poor patient; the organs of his senses become so irritable and easily affected, that the slightest breath of air, sound to the ear, and light to the eye become painful and disagreeable.

This irritating cause, by affecting the vascular system in general, causes a particular stricture on the vessels, which, by increasing the action and reaction of the solids and fluids one upon another, is always productive of those inflammatory symptoms which are constantly attendant on this disorder; which stricture on the blood-vessels, which are every where destined to feed the brain and nerves with animal spirit, thus, by preventing the regular influx of this great agent of life and motion into the interstices of the muscles and other moving fibres of the body, spasms and convulsions are produced. This animal æther, though derived from matter (from the essence of our food, and from the circumambient air we breathe) is so wonderfully spiritualized,

that we know neither the nature nor consistence of it, as being indiscernible, and incapable of being received by any artificial means; but still, we know in a great measure the uses of it to the animal œconomy. I may justly say, it is this subtil spirit, which receives the touch of electric fire, and passes it through the body as quick as thought, which also seems to be the cause of immediate and remote sympathy; and from the following observations, I shall endeavour to prove, that it is with it the all wise and mighty artist has united that intelligent spirit which he was pleased to infuse into the human body, so that a disorder being first produced, in that which I call the animal spirit, from the evil effect of the canine virus received into the habit, the faculties of the rational soul become so depraved, that towards the close of this melancholy catastrophe, the wretched victim really thinks, at the approach of every violent paroxysm, he is changed into a dog, which we may clearly understand from his barking and snapping at his best friends, and foaming at the mouth as those animals do in this disorder; and as he finds this dreadful change coming upon him at intervals, he warns his friends of it, and tells them to keep out of his way.

Let us reflect for a moment, that the eternal wisdom in all ages and at all times, doth preside over the actions of men; and when we do or will to act contrary to the light of understanding given us to avoid evil and do good, he seems immediately to take notice of it, and informs the body of the injustice done, either against him, or ourselves, or others, by striking us with terror, and with a self-con-viction of our own guilt; which more or less disorders the whole frame, and throws every moving fibre into a state of tremor and spasm, which not unfrequently destroys the rational faculties; and brings on lesser degrees of madness: though still, I am persuaded that such disorders frequently have many other remote and proximate causes, but still, as they are most commonly spiritual, they almost always baffle the use of medicine, which is God's second cause of health. Thus the moral conduct has a good or evil tendency towards the health of mind and body, which are evident proofs of the existence of a just and all wise God.

After a nice examen and dissection of a person who died of the hydrophobia, which mr. Fauvrey had performed, he gives us the following conjectural account.

“The nature of the poison is such, that it dissolves the balsamic and nutritious parts of the blood, whence the veins
“are dried up, so as not easily to admit any blood from the

“arteries, and the arterial blood by this means sustaining
 “the action and impression of its vessels so long a time, is
 “still further dissolved, attenuated and spiritualized, and
 “thus sent in too great quantity and with too great rapidity
 “to the brain, whence those convulsions and distractions,”
 &c.

Although the dread of water is a symptom particularly ascribed to this species of madness, still we find it is neither peculiar to it, nor always attendant on it, for it has been observed that this remarkable symptom is proper to some fevers and some particular inflammations, &c.

The smallest particle of the saliva of a mad dog is sufficient to produce the infection, and if it should take effect, it will first produce pain, inflammation, and ulceration on the part, before the terrible symptoms appear, though the wound, if any there be, should entirely heal and disappear; the neighbouring parts first begin to be affected with pains similar to those in the rheumatism, till by degrees the poison is received into the viscera and vital parts. From the first there will be always observable a constant constriction in the gullet, together with a difficulty of swallowing. But if the patient is affected at the sight of liquid, a horror seizes him, and if he strives to drink, spasms are produced, with anxiety and loss of sense; there is constantly a particular stricture and heaviness on the breast, and a struggling, as it were, for breath observed: a sighing, a nausea, and a vomiting, which tightness and seeming weight upon the breast, increase towards the close of this melancholy scene: an unusual flow of saliva then comes on; an involuntary emission of semen and priapism also: the fever and thirst increase; the urine becomes lixivious and in small quantities; the tongue hangs out, and the mouth foams; the pulse becomes throbbing and convulsive; the strength fails; cold sweats come on, and the miserable patient soon expires in the spasms.

Although at present we are doubtful whether the canine poison is the effect of morbid action of the parts endowed with life; or whether it proceeds from a more remote cause, yet it is most probable, as dogs in general are apt to feed upon putrid cadaverous substances with great avidity, the gas which is separated from such in a putrid or other evil state of fermentation in their stomachs may be capable of producing such evil effects; it is also very probable, the gastric juice with which those animals are supplied, which enables them to dissolve and digest

digest bones swallowed wholly and entire, contributes not a little to the more speedy extrication and production of this kind of mephitic air, in greater quantities, in a given time, than could possibly be effected by a slower operation of the like process in other animals, who are not possessed of such a quick digesting menstruum.

Let us observe, that under similar circumstances, as to a faulty digestion in the human body, approaching to an acid or other evil state of fermentation in the stomach and *primæ viæ*, it is always productive of nervous disorders and spasms, more or less, and of low spirits: consequently the more immediate, or proximate cause of those diseases, admits of a very striking analogy. Therefore, it is highly probable, if we were to live less upon animal, and more upon vegetable diet, disorders of this nature would be less prevalent.

Dr. James has observed, that this kind of madness, properly belongs to the canine genus, consisting of three species, viz. dogs, foxes, and wolves, to whom only it seems inherent and natural, scarcely ever appearing in other animals, except it be inflicted by those of the dog kind.

Some are of opinion, the canine poison is of an acid, and some again suppose it to be of an alkaline nature; but from my ideas of the nature and first cause of it, I am strictly in favour of the former opinion; admitting the existence of ærial acid, derived from putrid animal substances, which repels flame and extinguishes fire: in whatever shape, and in whatever stomach it is generated, it always acts more or less upon the living principle.

Dr. Seleg, who has written upon this subject, thinks the pervagum and intercostal nerves, are the seat of this complaint, because most of the symptoms happen where these nerves are interspersed; from whence it appears that the stomach is the principal and original seat.

By way of a caution to the reader, it may not be amiss to insert the pathogmonic signs of madness in dogs, according to Boerhaave, as follows. "He neither eats nor drinks; he looks sad and sullen, and runs at any thing in his way, whether man or beast, known, or unknown; with a murmuring noise, but without barking, nodding as if he was overpowered with sleep, and endeavouring to hide himself." Others also observe, that a dog not infected, upon smelling the infected one, will shun him, and run away with horror; and that those creatures will become disordered if they go into kennels where mad dogs have been kept: but it was never known that mankind received

the infection any other way, than by coming in contact with the poison.

It is very remarkable, that this animal virus sometimes lies dormant for many months; but in general it appears in three or four weeks: and if in six weeks no signs of the disorder appear, a person is usually concluded to be safe. However we have had instances of its appearing in two or three days after the bite: yet there are also instances, well attested, in which, one or two years have elapsed before it had taken place, which, though it should seem curious and mysterious in this disorder, I think it is no less observable in the small pox, measles, venereal disease, and in short, in all other kinds of malignant infection, or contagious miasmata floating in the atmosphere. These phenomena, I shall take upon me to explain as follows, although I have never known either ancient or modern writers to say any thing satisfactory upon that head.

If we turn our thoughts on chemistry, we may see how many various operations of it tend to prove that there is a power in bodies, properly called repulsion, which prevents them from uniting together, after they have approached each other to a certain point, which is as real and as absolute as the power of attraction. Though still from changes incident to matter, it is, under such circumstances, still subject to the laws of attraction. That those respective powers are as proper to the living subject, as to other material bodies, cannot be denied from the following observations, and I believe the one to be equally various with the other. How evident does the power of repulsion appear in local gangrenes, where we see the chemical properties of the sound and living parts form a separating action from those of the morbid and unsound: the sound and elastic fibre, by the force of cohesion, preserving its natural form and shape: and the rarefying effect of fire in the circumambient air, the bulk of the fluid parts being incessantly enlarged; the fire acting by pulsation, as well as distension, it constantly excites the elastic fibre to action, and so maintains motion and vital heat. In spaciolous or gangrenous cases, one part of the living subject preserves life and motion, whilst a dissolution and destruction ensues in another, by losing its fixed air, after a species of fermentation is commenced, although the air is a common medium by which the union of parts is preserved, still, if it was received into the sound parts, it would promote a like dissolution and destruction there. But those sound and living parts are still preserved from its destruc-

tive quality, by their retaining due degrees of density and cohesion in their own component parts.

Let us further observe, that the tender and delicate constitution of the solids, not oppressed with gross humours, is exquisitely sensible, if unattended with any disorder in the brain or nerves, which acuteness of sensibility is various in different habits and climates, as the former are more or less full; and as it approaches to greater or lesser degrees, the sympathy of affection and symptoms appear sooner or later.

The tense and lax fibre we know are by nature predisposed to favour the proximate cause of disease, the former by exciting too much heat, and the latter too little in the animal economy; but when it is so happily disposed as to be neither too tense nor lax, the offices of secretion and excretion are in such state well and duly performed; because the heat of the body consequently falls between extremes which constitute that salutary state in which we are less susceptible of the remote cause of disease.

Cullen distinguishes two species of this disorder. The hydrophobia rabiosa, when there is a desire of biting, and the hydrophobia simplex, when there is not any such desire.

Celsus, Galen, Mead, and Etmuller, all recommend in this, as well as in other venomous cases, to enlarge the wound made by the bite, by a circular incision and scarification, to apply a cautery to it, and keep it open for at least forty days: but as this method appears rather too harsh, I shall beg leave to advise a far preferable one, which is by the moderns now considered as a specific; they scarify the part, and sprinkle cantharides every second or third day into the wound, and keep it open for a considerable time.

But if the poison is first received on a bony or tendinous part, I would by all means recommend the practice of the people of Connecticut—for, it is confidently said, they never have experienced any ill effects in such cases, from their usual treatment. They rub a handful of salt and water well on the part, and lay a parcel of salt thereon, and wrap it up in different folds of a wet cloth, dipt in the same salt water.

Under this head I shall also mention the following instance of a cure, which is really worth notice, which was taken from the records of the British royal academy of sciences. A maid of twenty years of age, having all the symptoms, was bathed in a tub of river water, wherein a bushel of salt had been dissolved; they plunged her in naked, again

and again, till harrassed almost to death ; they then left her sitting in it quite senseless: when she came to herself, she was surpris'd to find herself looking at the water without any concern.

I am of opinion that this practice may be used with great advantage in far advanced and desperate cases ; provided the person was of a lax and loose habit of body (as to the constitution of the solids) but if it should happen to be the reverse, I think the patient might be prepared for the salt bath by blood letting. From the nature and penetrability of sea salt, it does not appear to me, that there is any method that promises such a speedy relief as this ; it is calculated not only to counteract the evil tendency of the poison, but also to supply the defect of vital heat, and support the exhausting strength, without breaking the crisis of the fluids, as mercury does.

And what is still more persuasive, the frequent and sudden plunging of the patient over head and ears in sea water, after the bite, has been generally reckoned to be the best and surest preservative in this disease. In those advanced stages when the poison seems to be received into the vital parts, there is no probability of succeeding with mercury, though it is most commonly received into practice, in the cure of this malady.

Alexipharmic drinks, with testaceous powders, were so much extolled among the ancient physicians, that Galen affirmed nobody had ever died, who used this remedy : these absorbent earths were to be taken every day for forty days successively, either alone or with Gentian root and Frankincense in wine.

The ancients having most commonly practised blood letting, in such cases, perhaps their method of cure, principally on this account, was the best ; which I am persuaded, they had advised, rather to keep the patient low, and his strength under ; than that they ever supposed a plethora or redundance of humours had any share in them.

It is certain, that where a stricture lies upon the vessels from an irritating cause, as I have before sufficiently stated, the bulk of the humour must be lessened by venesection, to bring on a relaxation, and so give a free and easy influx to fresh animal spirit into the interstices of the muscles, and facilitate the progress of the cure by the help of proper remedies.

This is not the only case in which we are not to depend upon the pulse with respect to blood letting. In some plethoric cases, the vessels are so overcharged and distended

beyond their natural degree of contraction, and their tonic powers so impeded, that the pulsation is scarcely to be felt, without any appearances of an acute or inflammatory disorder: but we must have other convincing proofs of plethora, before this serious and delicate operation should be performed.

I am more particular on this point, because there are so many various opinions for and against the necessity of blood-letting in the hydrophobia.

From the assertions of the ancients, and their rational method of cure, I am persuaded that the acrimony peculiar to this disease, may be destroyed more ways than one.

To those who are but little skilled in physics, it may appear, that there are various ways and means by which we may relieve one and the like complaint, proceeding from a defect of the vital heat; still, such ways and means must not differ essentially in nature, to accomplish the great design of assisting and supporting the living principle. This comparison holds good with respect to the former observation.

It must be the like case in this disorder, as in others; when it is far advanced, there are but very faint hopes of success; however, although the symptoms of subfultus tendinum are present, we must still see what art can do; let blood first, and repeat the operation, till the patient faints; the next day try the salt bath, and after two or three days' repetition, apply the strong mercurial ointment by friction, so as to raise a very gentle ptyalism, give opium and antimonials or other perspiratives, to relieve spasmodic stricture; and keep the patient principally upon a milk and vegetable diet, with ripe and acetous fruits, and allow a moderate use of generous wines: and when occasion shall require to loosen the belly, or free it from any acrid matter it may be troubled with, it is best to be done by injection or some very mild and gentle aperient. The fore, or part whereon the poison was first received, may be treated as before directed.

A frequent use of the warm bath is inadmissible; because it debilitates the habit, and renders it unfit for taking proper means. Although it gives a temporary relief in spasmodic stricture, the evil consequences it is afterwards attended with, by far exceed any good it may do otherwise.

T H E E N D.

NATIONAL LIBRARY OF MEDICINE



NLM 01193833 9